

## COMPARATIVE GROSS ANATOMY OF PECTORAL GIRDLE IN DOMESTIC FOWL (*GALLUS DOMESTICUS*) AND PIGEON (*COLUMBA LIVIA*)

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### SUMMARY

Pectoral girdle is one of the important components of skeletal system associated with flight in birds. The pectoral girdle in both pigeon and domestic fowl is formed by three bones namely scapula, coracoid and clavicle. The present study was undertaken with the aim of explaining the differences in pectoral girdle of flying and non flying birds. The scapula appeared as a long sword like bone with sharp borders and was located roughly parallel to the vertebral column in both the species. The coracoid was observed as a short, thick rod like bone, its proximal end articulated with humerus and scapula and the distal end articulated with sternum. The clavicle appeared as a thick bent rod directed downwards and backwards. The clavicles of two sides united with each other and formed 'U' shaped appearance.

**Keywords:** Clavicle, Coracoid, Pectoral girdle, Scapula

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Anatomical structure of bird shows many unique adaptations and this anatomical specialization has earned birds their own class in the vertebrate phylum. The pigeons which belong to Columbidae family have a well developed shoulder girdle and wing muscles and they are the strongest flyers of all birds. Domestic fowl is a bird of pheasant family and is ground feeding and non-flyer. Pectoral girdle is one of the important components of skeletal system associated with flight in birds (John *et al.*, 2017). The present study was undertaken with the aim of explaining the differences in pectoral girdle of flying and non flying birds.

The present study was carried out on the pectoral girdle of domestic fowl and pigeon by using three sets in each species irrespective of the sex. In both species, the wings along with sternum were collected from local slaughter house at Namakkal. The collected specimens were allowed for natural maceration for a period of one month. Afterwards, the decomposed feathers and muscles were removed and the different bones of pectoral girdle were collected and dried under sunlight for ten days (Raghavan, 1964). The collected bones were utilized for the comparative gross anatomical description in both the species.

The pectoral girdle forms the connection between the trunk and forelimb. The pectoral girdle in both pigeon and domestic fowl was formed by three bones namely scapula, coracoid and clavicle as mentioned by Nickel *et al.* (1977) in domestic fowl, Beaufre, (2009) in goose and Indu *et al.* (2012) in green winged Macaw and Peahen. All the three bones of pectoral girdle were stronger and

thicker in domestic fowl (Fig 1). They were thin and light weighed in pigeon (Fig 2) to facilitate the flight mechanism. But John *et al.* (2017) mentioned that the bones in shoulder girdle of kite were larger and stronger.

**Scapula:** The scapula appeared as a long sword like bone with sharp borders and was located roughly parallel to the vertebral column in both the species studied as explained by Shabir *et al.* (2013) in Geese. In both the species, the scapula had two borders, two surfaces and two extremities (Fig 1 & 2). The caudal end of the scapula was extended upto the level of cranial border of ilium and the cranial end was located at the level of last cervical vertebra. The caudal end appeared pointed and thin in pigeon and it was thicker and blunt in domestic fowl (King and McLelland, 1984).

In scapula of domestic fowl, the cranial end had lateral articular facet for head of the humerus and medial projection. The medial projection was presented with medial process (acromian/clavicular) and convex protuberance (coracoid process) which were articulated with the clavicle and coracoid, respectively. The lateral articular facet and medial process were separated by a notch as noticed by Shabir *et al.* (2013) in Geese. The acromian and coracoid processes were not much distinct in pigeon compared with domestic fowl (Nickel *et al.*, 1977).

In domestic fowl, the costal surface was concave, smooth and was related to the ribs. The lateral surface was convex and smooth whereas in pigeon both the surfaces were flat. But Sharma and Dubal (2018) reported that the costal surface was convex and lateral surface was concave in Emu.

**Coracoid:** The coracoid was observed as a short, thick rod

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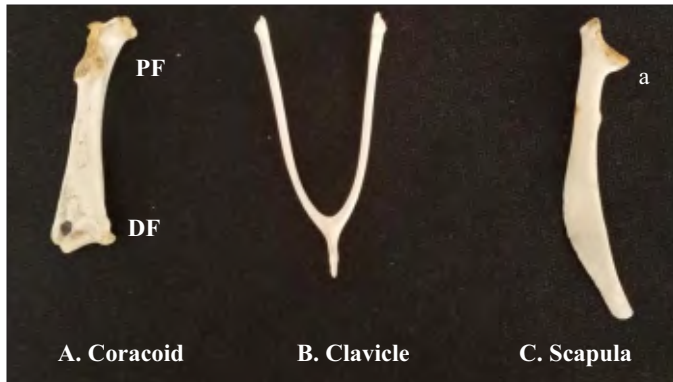


Fig. 1. Photograph showing Coracoid, Clavicle and Scapula of Pectoral Girdle in Domestic Fowl, a- medial projection, PE- proximal extremity, DE- Distal extremity

like bone directed downwards and backwards. In domestic fowl, the proximal extremity had hook like process medially. A small articular area was noticed for articulation with humerus and below that another articular area was present for articulation with scapula. The distal extremity was spatula shaped and articulated with the sternum. Pneumatic foramen was also noticed in the distal end of coracoid (Tomar *et al.*, 2010).

In pigeon, the proximal extremity had facet for humerus on the medially projected hook like process and below, it had a small process with facet for scapula. Both these processes incompletely met with each other and formed a foramen (procoracoidel foramen) (Fig 2). The distal end was similar to domestic fowl but had two or three fine nutrient foramen (Parvez *et al.*, 2016).

**Clavicle:** The clavicle appeared as a thick bent rod directed downwards and backwards. The clavicles of two sides united with each other and formed 'U' shaped appearance (Fig 1 & 2). The dorsal end of the clavicle was thick and had facet for articulation with the scapula and coracoid to form foramen triosseum whereas in case of pigeon, dorsal end had thin flat process and a round facet laterally for articulation with scapula and coracoid and formed a foramen triosseum (Shabir *et al.*, 2013). Ventrally, the clavicle of two sides united with each other and formed a flattened plate, hypocleidium in domestic fowl (Hofling and Alvarenga, 2001) whereas the hypocleidium was not well developed in pigeon.

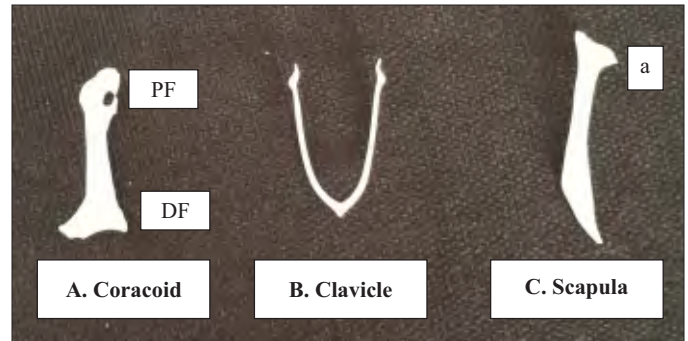


Fig. 2. Photograph showing Coracoid, Clavicle and Scapula of Pectoral Girdle in Pigeon, a- medial projection, PE- proximal extremity with procoracoidel foramen, DE- Distal extremity

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